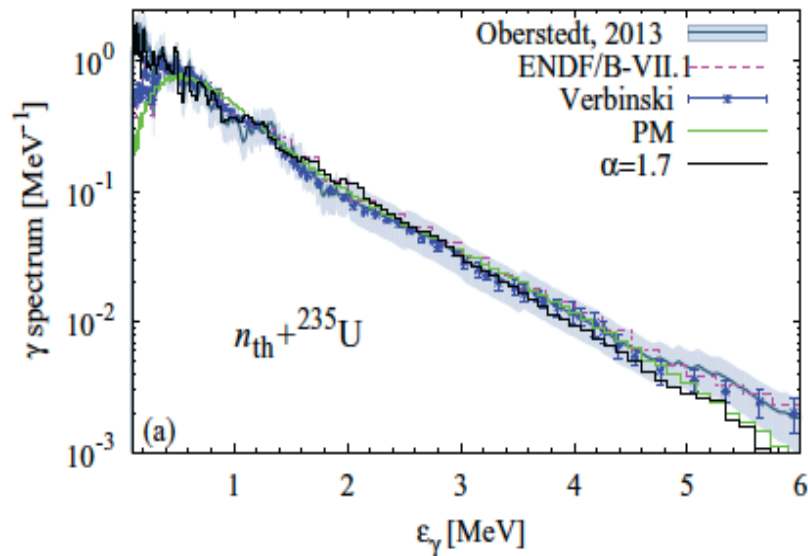
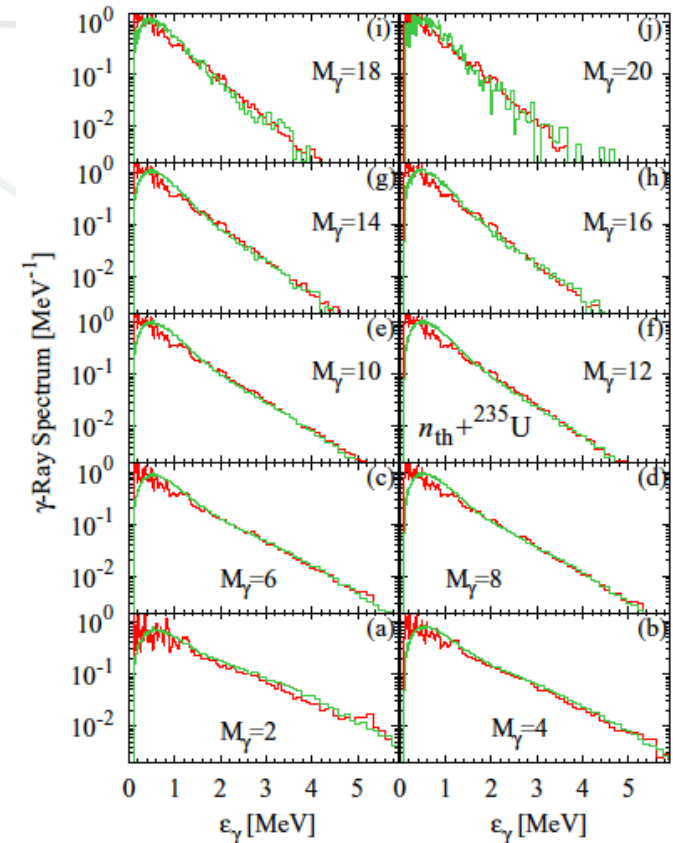


Prompt Fission Gamma Rays

- Renewed interest
- New experimental data from DANCE and Geel
- New modeling from LANL, LLNL, CEA, ...
- New ENDF files for U-235 and Pu-239 for thermal incident energies only



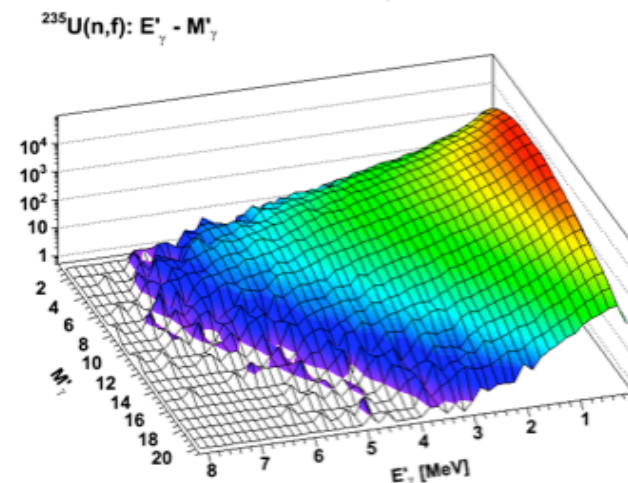
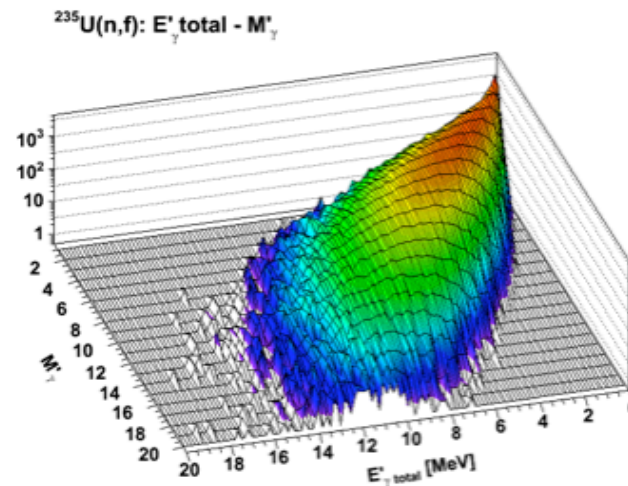
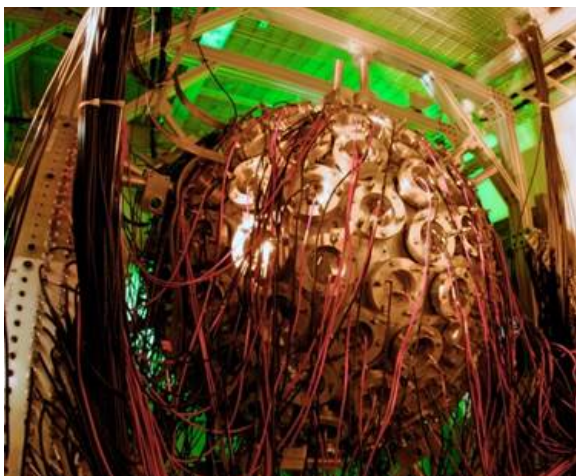
$^{235}\text{U}(n_{\text{th}}, f)$

CGMF calculations vs. IRMM and LANSCE data
Stetcu et al., PRC 90, 024617 (2014)

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Recent Measurements

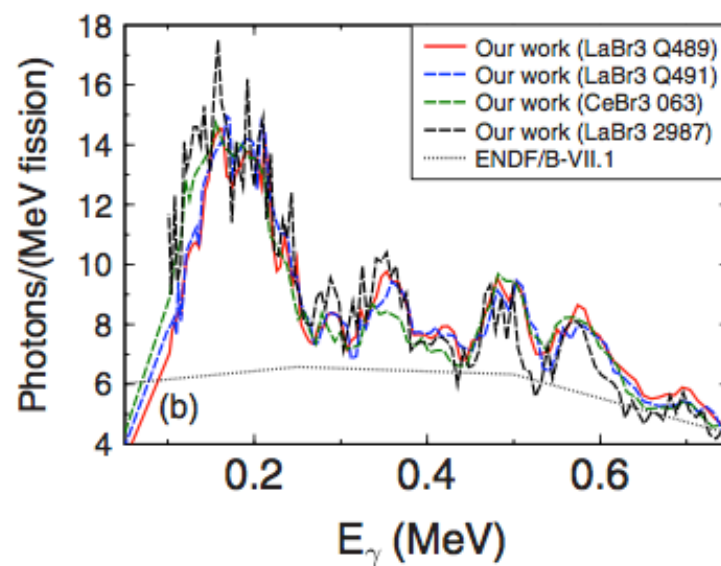
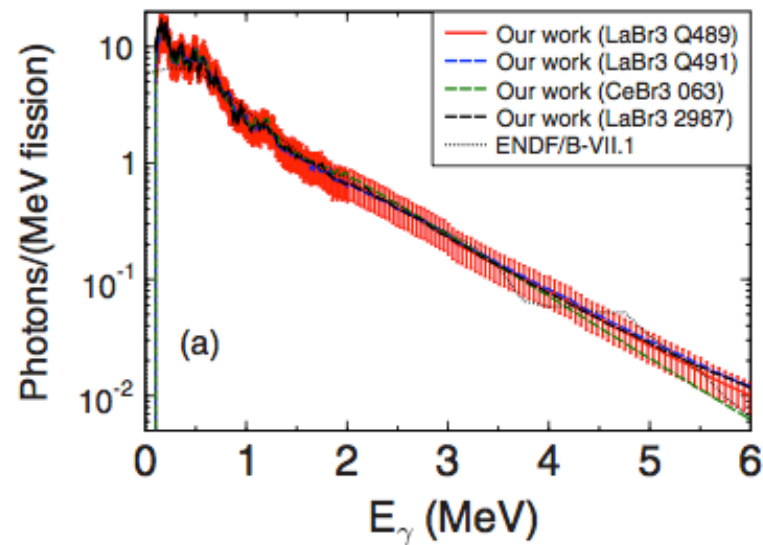
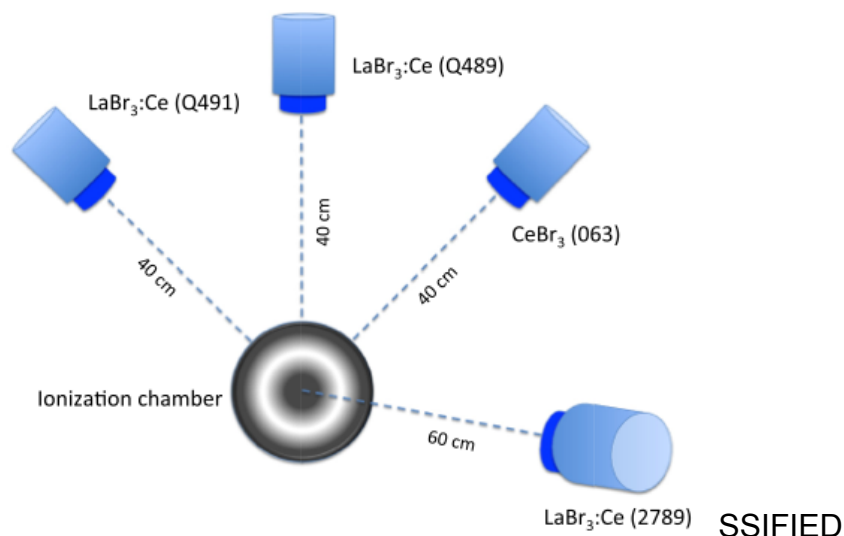
- Jandel, Ullmann, Chyzh, et al.
- **DANCE**
(Detector for Advanced Neutron Capture Experiments)
- Lujan Center at LANSCE
- Highly-segmented 160 x BaF₂ crystals in 4 π geometry



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Recent Measurements

- Measurements of $^{252}\text{Cf}(\text{sf})$, $^{235}\text{U}(n_{\text{th}},\text{f})$ and $^{241}\text{Pu}(n_{\text{th}},\text{f})$ PFGS
- Billnert et al., Phys. Rev. C **87**, 024601 (2013); Oberstedt et al., Phys. Rev. C **90**, 024618 (2014)
- KFKI reactor, Budapest, LaBr_3 and CeBr_3 scintillators



$^{241}\text{Pu}(n_{\text{th}},\text{f})$

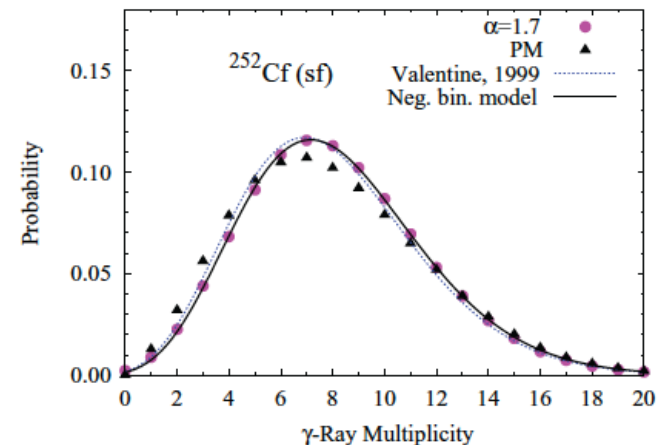
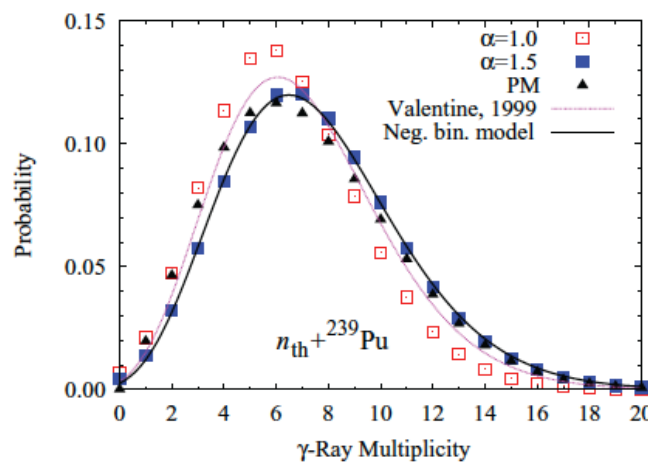
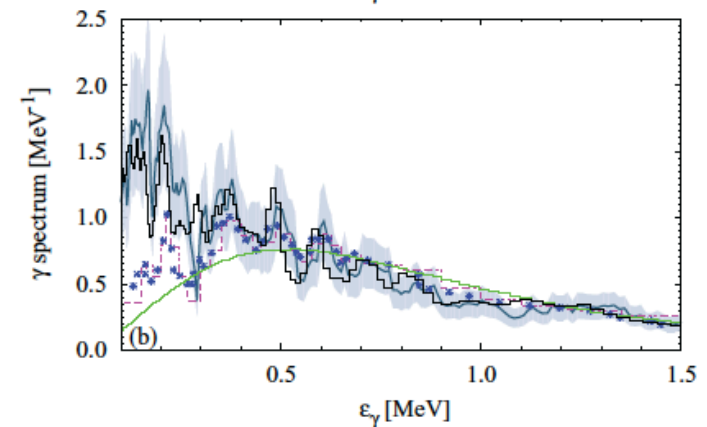
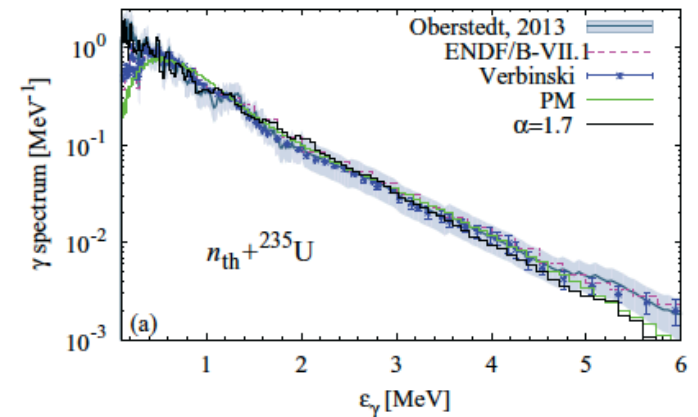
Slide 12

Model Calculations

- Monte Carlo simulations of FF de-excitation:

CGMF (LANL), FREYA (LBNL, LLNL),
FIFRELIN (CEA)

- Calculations of PFGS, $P(\nu_\gamma)$, γ - γ correlations, etc.
- Stetcu, Talou, Kawano, Jandel, Phys. Rev. C 90, 024617 (2014)



Average Prompt Fission Gamma Multiplicity < ν_γ > and Total Energy < E_γ^{tot} >

Isotope	Quantity	ENDF/B-VII	Oberstedt	DANCE (Jandel)	DANCE (Chyzh)	CGMF (LANL)
Pu239T	< E_γ^{tot} > (MeV)	6.741	-	8.07	7.94	6.66
	< ν_γ > (γ/f)	7.78	-	7.08	7.93	7.48
U235T	< E_γ^{tot} > (MeV)	6.600	6.96	6.42	8.35	6.45
	< ν_γ > (γ/f)	7.04	8.19	6.23	7.35	7.41
Cf252 (sf)	< E_γ^{tot} > (MeV)		6.64	7.22	8.52	6.85
	< ν_γ > (γ/f)		8.30	8.02	8.75	8.15

Caution when comparing data and models...

Threshold gamma energies (E_{th} =100 keV; 300 keV) and time-coincidence window (6ns; 100ns) [Oberstedt; Jandel]

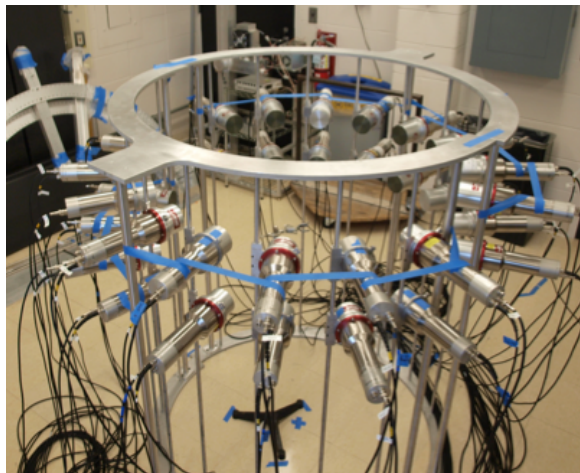
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Correlated Fission Data

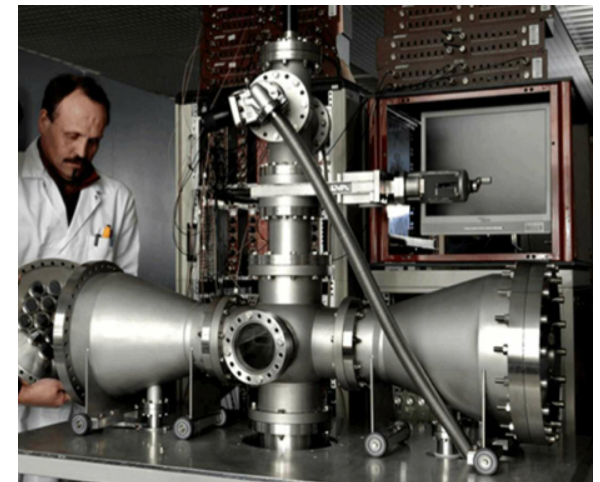
- Monte Carlo model calculations can predict correlated data in fission
- Recent and future experiments
- Data **not** for ENDF files; calculations directly in transport codes instead



DANCE, Los Alamos
n- γ -FF correlations



Univ. Michigan @ LANL
n-n and γ - γ correlations



VERDI @ IRMM
 γ -FF correlations

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